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Lars L. Stigsson
Kvarnstugevagen 21
Saltsjobaden, 13336
SWEDEN

EXAMINER

KINNEY, ANNA L

ART UNIT

PAPER NUMBER

1731

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/759,047

Applicant(s)

STIGSSON, LARS LENNART

Examiner

Anna Kinney

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 January 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-17 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-17 is/are rejected.
- 7) ☒ Claim(s) 1, 17 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION***Information Disclosure Statement***

The Examiner considers that the page entitled "References referred to in Method for the Production of High Yield Chemical Pulp from Softwood" submitted on January 20, 2004 was intended by the applicant to be an information disclosure statement (IDS). Although the submission is in compliance with the provisions of 37 CFR 1.97, applicants are encouraged to use the USPTO forms when preparing an IDS. See MPEP §609; a copy of forms PTO-1449, "Information Disclosure Citation" and PTO/SB/08A and 08B are reproduced at the end of the section to indicate how the forms should be completed. To avoid any confusion as to whether these references have been considered, the Examiner has included them in Form 892.

Specification

The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

The following title is suggested: pulp production with quinone impregnation, low sulfidity pulping with boron compounds, tall oil soap removal, and oxygen containing gas treatment.

The abstract of the disclosure is objected to because of the following informality: on line 7, the word "have" should be the singular "has" to match the subject "pulping process". Correction is required. See MPEP § 608.01(b).

The disclosure is objected to because of the following informalities: On page 1, line 26, the Examiner suggests that a word may be missing in the last

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sentence of this paragraph. The statement that “qualities may also have fibers” does not appear to make sense. Also on page 1, line 30, the word “in” should be inserted between “raw material” and “the Northern hemisphere”. On page 2, line 8, the word “yields” should be the singular “yield”; and on line 31, the word “uses” should be the plural “use” to match the subject “processes”. The Examiner suggests that the applicant review the specification for similar grammatical errors, particularly on pages 3 through 5.

Appropriate correction is required.

Claim Objections

Claim 1 is objected to because of the following informalities: steps a), b), c), d), e), f), g), and h) have periods at the end of the step. This is improper form for a claim. See MPEP 608.01(m). Each claim begins with a claim number and ends with a period. Periods may not be used elsewhere in the claims except in abbreviations. Appropriate correction is required.

Claim 17 is objected to because of the following informalities: at the end of line 1 of the claim, the word “gas” appears to be missing, which would produce a phrase similar to that at the end of claim 16, “an oxygen containing gas”.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

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Claims 11 and 17 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. With respect to claim 11, the limitation that hardwood pulp was produced using a cooking liquor recovered from the chemicals recovery plant of step f) did not appear in the specification. With respect to claim 17, the specification does not discuss treating pulp with an oxygen containing gas in a separate oxygen delignification reactor. The only reference to an oxygen containing gas is the first paragraph of page 10, which does not include the separate reactor described in claim 17.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 2, 8, 9, and 14 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 2 is unclear in the basis for calculating yield. The Examiner considers the intended calculation to be the mass of dry wood remaining after impregnation divided by the mass of dry wood provided prior to impregnation.

Claims 8 and 9 recite the limitation "the impregnated chips stream" in line 2 of each claim. There is insufficient antecedent basis for this limitation in the claims. No previous reference is made to an impregnated chips stream. The

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Examiner suggests adding a phrase such as "to produce a stream of impregnated chips" to claim 1, step a), which would provide antecedent basis.

Claim 9 recites the limitation "the chips feed stream" in the last line of the claim. There is insufficient antecedent basis for this limitation in the claim. No previous reference is made to a chips feed stream. The Examiner suggests that a phrase such as "where chips are fed" might be used to replace the current limitation.

Claim 14 recites the limitation "the alkali metaborate" in the first line of the claim. There is insufficient antecedent basis for this limitation in the claim. No previous reference is made to an alkali metaborate. The Examiner suggests that deleting the word "the" in this phrase would eliminate the need for antecedent basis for this limitation.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1 through 8, 10, 12, 13, and 15 through 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stromberg et al (U.S. Patent 6,569,289) in view of Stigsson (WO Publication 01/59204 A1), Bair et al (U.S. Patent 6,294,048) and Tate (U.S. Patent 4,256,628).

With respect to claim 1, Stromberg et al discloses a method for the operation of a high yield (Abstract, lines 7-11) softwood (column 5, line 65 to column 6, line 5) pulping process using alkaline pulping liquors (Abstract, lines 7-11) comprising the steps of; a) contacting softwood chips with an aqueous impregnation solution (column 1, lines 56-61) comprising a quinone compound (anthraquinone or its derivatives or equivalents; column 1 line 66 to column 2, line 4) in an impregnation zone of a closed vessel (column 2, lines 31-53) at a temperature in the range of 80-130°C, typically less than about 120°C, and preferably about 110°C or less, which contains three specific points (110, 120 and 130) within the claimed range of from about 100°C to about 150°C and during a time period of between about 2-60 minutes, which contains two specific points (2 and 60) within the claimed range of from about 1 minute to about 120 minutes; b) charging an alkaline cooking liquor to softwood chips recovered directly or indirectly from step a) (column 1, lines 61-64); c) cooking impregnated softwood chips in the presence of said alkaline cooking liquor (column 7, lines 6-9) in a digester (Figure 1, item 11) in order to obtain a brown pulp product in a yield at least 2% higher than if the invention were not practiced. The Examiner considers the yield expected if the invention were not practiced to be about 48% (Instant specification, page 1, lines 17-18), indicating a yield as described by Stromberg et al would be 50%, which contains one specific endpoint (50) within the claimed range of from 50 - 70 %.

Stromberg et al does not disclose expressly that the pulping process occurs in a pulp mill; that the alkaline pulping liquors have low sulfidity; that said

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cooking liquor has a sulfidity level below about 25 %; d) extracting cellulose spent liquor comprising tall oil soap from step c); e) removing tall oil soap from cellulose spent liquor and concentrating spent liquor in evaporators to provide a stream of concentrated spent black liquor; f) transferring concentrated spent black liquor from step e) to a chemicals recovery plant; that the method is characterized in that g) a pH level below about 7 is maintained in the aqueous impregnation solution of step a) during at least a portion of said time period of from about 1 minute to about 120 minutes; h) the alkaline liquor used in step b) comprises dissolved boron and alkali metal compounds, said boron compounds being present in a concentration corresponding to a molar ratio of alkali metal to boron of from about 2:1 to about 10:1; or i) further treatment of tall oil soap removed from cellulose spent liquor in step d) is performed by at least one of: i1) reacting tall oil soap with a chemical compound substantially free from sulfur; and, i2) burning tall oil soap or partly acidulated tall oil soap in a combustion plant capable of accommodating alkali metal containing fuels.

At the time of the invention, it would have been obvious to a person of ordinary skill in the art that the method is performed in a pulp mill, since the paper industry performs pulping in pulp mills.

Stromberg et al does disclose that the amount of alkali is most desirably substantially zero (column 2, lines 28-30). The Examiner considers this to mean that the pH of the impregnation liquor is ideally no higher than 7, which falls within the claimed range of no higher than 7. In addition, Stigsson discloses a pretreatment stage using a pulping catalyst such as anthraquinone (page 11, line

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33 to page 12, line 4) with a pH in the range between about 2 to 7.0, preferably to a level between 2.0 and 6.0 (page 11, lines 20-22), which includes three specific points including one endpoint (2.0, 6.0, and 7.0) within the claimed pH range of no higher than 7.

Stigsson discloses that the alkaline pulping liquors have low sulfidity, in fact that the process is substantially sulfur-free (Abstract, line 1), which indicates that said cooking liquor has a sulfidity level that falls within the claimed range of below about 25%.

Stigsson also discloses h) the alkaline liquor used in step b) comprises dissolved boron and alkali metal compounds (page 12, lines 31-33). Stigsson does not disclose expressly that said boron compounds being present in a concentration corresponding to a molar ratio of alkali metal to boron of from about 2:1 to about 10:1.

Bair et al discloses boron compounds being present in a concentration corresponding to a molar ratio of alkali metal to boron of above 3:1, preferably in the range of from about 4:1 to 400:1, more preferably in the range of from about 5:1 to 200:1, and most preferably in the range of from about 10:1 to 100:1, which contains four specific points (3:1, 4:1, 5:1, and 10:1), including one endpoint, within the claimed range of from about 2:1 to about 10:1. Although the disclosed molar ratios refer to smelt produced from combustion of black liquor, the Examiner is not aware of any significant increase or decrease in the mass of alkali metal or boron due to the cooking, tall oil soap separation, or combustion

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processes. Therefore, the Examiner considers the molar ratios recited by Bair et al to be applicable to the alkaline liquor used in instant step b).

Tate discloses d) extracting cellulose spent liquor comprising tall oil soap from step c) (column 1, lines 10-12); e) removing tall oil soap from cellulose spent liquor and concentrating spent liquor in evaporators to provide a stream of concentrated spent black liquor (column 1, lines 12-16); f) transferring concentrated spent black liquor from step e) to a chemicals recovery plant (column 1, lines 22-24); and i) further treatment of tall oil soap removed from cellulose spent liquor in step d) is performed by; i1) reacting tall oil soap with boron trifluoride, a chemical compound substantially free from sulfur (column 1, line 68 to column 2, line 4).

With respect to claims 2 and 3, Stromberg et al does not disclose expressly that the yield over the impregnation step a) calculated based on dry wood substance flow prior to charging alkaline cooking liquor in step b) and dry wood substance flow entering step a) is in the range of about 90 to 99%, or in the range of 95 to 98%. However, at the time of the invention, it would have been obvious to a person of ordinary skill in the art that since the conditions and materials are the same as those recited in the instant invention, the yield results would also be the same.

With respect to claim 4, Stromberg et al, Stigsson, and Bair et al do not disclose expressly a chemical compound substantially free from sulfur in step i1) is at least one of carbon dioxide, carbonic acid, boric acid, acetic acid,

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hydrochloric acid, nitric acid, oxalic acid, formic acid, acetic acid and boron tri fluoride.

Tate discloses a chemical compound substantially free from sulfur in step i1) is boron tri fluoride.

With respect to claim 5, Stromberg et al discloses that a quinone compound used in step a) is selected from the group consisting of anthraquinone and derivatives thereof.

With respect to claim 6, Stromberg et al and Stigsson do not disclose expressly that the molar ratio of alkali metal and boron of step h) is from about 2:1 to about 4:1.

With respect to claim 6, Bair et al discloses the molar ratio of alkali metal and boron of step h) is above 3:1, preferably in the range of from about 4:1 to 400:1, which includes two specific points (3:1 and 4:1), including one endpoint, within the claimed range of from about 2:1 to about 4:1.

With respect to claim 7, Stromberg et al does not disclose expressly that the sulfidity of the alkaline cooking liquor of step b) is lower than about 10%.

Stigsson discloses that the process is substantially sulfur-free (Abstract, line 1), which indicates that the sulfidity of the alkaline cooking liquor of step b) is within the claimed range of lower than about 10%.

With respect to claim 8, Stromberg et al discloses that spent impregnation liquor is removed from the impregnated chips stream prior to the charging of alkaline liquor to the chips in step b) (column 6, lines 17-21).

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With respect to claim 10, Stromberg et al does not disclose expressly that the pH level in the impregnation zone of step a) is between about 2 to 5, said pH level achieved primarily by the in situ hydrothermal decomposition of softwood material and concurrent generation of organic acids.

Stigsson discloses the pH level in the impregnation zone of step a) (page 10, line 29 to page 11, line 6) is between 2.0 and 6.0 (page 11, lines 20-22), which encompasses the claimed range of between about 2 to 5, and includes one specific endpoint (2.0). Stigsson does not disclose expressly that said pH level is achieved primarily by the in situ hydrothermal decomposition of softwood material and concurrent generation of organic acids. However, at the time of the invention, it would have been obvious to a person of ordinary skill in the art that the impregnation conditions recited result in hydrothermal decomposition of softwood material and concurrent generation of organic acids, which would bring the pH of the material in the vessel lower than the starting pH. Any further pH change provided by acidic or basic reagents is as an adjustment to stay within the optimum performance range, although the pH is not critical (page 11, lines 20-22).

With respect to claim 12, Stromberg et al does not disclose expressly that a quinone delignification catalyst is added to a cooking liquor or cooking circulation used in the preparation of bleached hardwood pulp.

Stigsson discloses that a quinone delignification catalyst is added to a cooking liquor (page 13, line 29 to page 14, line 1) used in the preparation of bleached (page 28, lines 10-14) hardwood (page 9, lines 32-35) pulp.

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With respect to claim 13, Stromberg et al does not disclose expressly that the cooking liquor charged to softwood chips in step b) consists primarily of alkali hydroxide, alkali metaborate and alkali carbonate dissolved in an aqueous solution.

Stigsson discloses that the cooking liquor charged to softwood chips in step b) consists primarily of a mixture of sodium hydroxide (an alkali hydroxide), sodium carbonate (an alkali carbonate), and sodium borates (such as sodium metaborate, an alkali metaborate), and dissolved in an aqueous solution (page 12, lines 31-35).

With respect to claim 14, Stromberg et al, Stigsson, Bair and et al Tate do not disclose expressly that the alkali metaborate and alkali carbonate are present in the cooking liquor in a combined concentration which is higher than the combined concentration of other dissolved compounds in the cooking liquor.

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to optimize the concentrations of the dissolved compounds in the cooking liquor. The concentration range is so broad as to indicate a lack of criticality.

With respect to claim 15, Stromberg et al does not disclose expressly that the alkaline cooking liquor of step b) is prepared without prior causticizing with lime or calcium compounds.

Stigsson discloses the alkaline cooking liquor of step b) is prepared without prior causticizing with lime or calcium compounds (page 12, line 35 to page 13, line 5).

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With respect to claim 16, Stromberg et al does not disclose expressly that softwood chips in a digester or softwood brown pulp recovered from step c) is subjected to treatment with an oxygen containing gas.

Stigsson discloses softwood brown pulp recovered from step c) is subjected to treatment with an oxygen containing gas (page 1, lines 5-9 and page 16, lines 20-22).

With respect to claim 17, Stromberg et al does not disclose expressly that treatment with an oxygen containing gas on softwood pulp is performed in a digester blowline before or after refining, in a brownstock washer or in a separate oxygen delignification reactor.

Stigsson discloses that treatment with an oxygen containing gas on softwood pulp is performed in a separate oxygen delignification reactor (page 27, lines 13-15), or in a brownstock washer (page 27, lines 28-30).

Stromberg et al, Stigsson, Bair et al, and Tate are analogous art because they are from the same field of endeavor, that of the manufacture of paper pulp. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to use a pH level as described by Stigsson in the impregnation stage of Stromberg et al, and to use a quinone delignification catalyst with a substantially sulfur-free process consisting primarily of sodium hydroxide, sodium carbonate, and sodium borates in an aqueous solution prepared without prior causticizing with lime or calcium compounds as described by Stigsson in the cooking stage of Stromberg et al, followed by treatment with an oxygen containing gas as described by Stigsson, to obtain the invention as specified in

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claims 1, 7, 10, 12, 13, 15, 16, and 17; to apply the molar ratio of alkali metal to boron as described by Bair et al to the cooking process of Stromberg et al and Stigsson to obtain the invention as specified in claims 1 and 6; to extract spent liquor, remove tall oil soap, transfer concentrated liquor to chemical recovery, and react the tall oil soap with boron trifluoride, as described by Tate, after the cooking process of Stromberg et al, Stigsson, and Bair et al, to obtain the invention as specified in claims 1 and 4.

The motivation for doing so would have been that the pH level disclosed by Stigsson provides optimum performance (Stigsson, page 11, lines 20-22); that additives are commonly used to increase the rate of delignification during alkaline digestion of cellulosic materials (Stigsson, page 13, lines 30-31); that the disclosure of new sulfur-free chemicals and more selective delignification methods combined with efficient recovery systems can lead to substantially better returns for the pulping industry along with environmental benefits (Stigsson, page 1, lines 26-28); that the most preferred buffer solution comprises sodium hydroxide, sodium carbonate, or sodium borates or mixtures of these compounds (Stigsson, page 12, lines 33-35); that the minimum use or even omission of a causticizing stage is a major advantage relative to the traditional soda and kraft pulping (Stigsson, page 13, lines 3-5); that pulping with oxygen based chemicals offers simplified pollution control (Stigsson, page 4, lines 19-21); and that two stage oxygen pulping processes can make use of existing pulping machinery and conversion of a kraft mill to the new technology should be feasible without major reinvestments (Stigsson, page 4, lines 24-26); that the

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partial autoaustization reaction efficiency has been found to increase with increases in the sodium to boron ratio (Bair et al, column 4, lines 29-31); that extraction and concentration of spent liquor, removal of tall oil soap, and removal of tall oil soap, and transfer of concentrated liquor to chemical recovery was previously known in the art (Tate, column 1, lines 10-24) and that pulp mills have been forced to upgrade their chemical recovery systems so that there is or will be less and less sulfur loss (Tate, column 1, lines 29-34); and boron trifluoride effectively converts the soap into tall oil without the necessity of an acidification (Tate, column 1, line 68 to column 2, line 4).

Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Stromberg et al, Stigsson, Bair et al and Tate, as applied to claim 1 above, and further in view of Adams et al (Alkaline Pulping, Pulp and Paper Manufacture, Third Edition, Volume 5, page 159).

With respect to claim 9, Stromberg et al discloses removing spent impregnation liquor from the impregnated chips stream prior to the charging of alkaline liquor to the chips in step b) using a conventional top separator (Figure 1, item 22) located inside a continuous digester (Figure 1, item 11; column 6, lines 14-21). Stromberg et al does not disclose expressly using an inverted top separator.

Adams et al discloses using an inverted top separator (page 159, column 1, lines 1-6).

Stromberg et al, Stigsson, Bair et al, Tate, and Adams et al are analogous art because they are from the same field of endeavor, that of the manufacture of

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paper pulp. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to use an inverted top separator as described by Adams et al in the digester of Stromberg et al, Stigsson, Bair et al, and Tate to obtain the invention as specified in claim 9. The motivation for doing so would have been to maintain a vapor space in the top of the digester in which the impregnated chips can be heated rapidly to cooking temperature with direct steam (page 159, column 1, lines 1-6).

Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Stromberg et al, Stigsson, Bair et al and Tate as applied to claim 1 above, and further in view of Elliot et al (U.S. Patent 5,567,277) and Smook (Handbook for Pulp & Paper Technologists, Joint Textbook Committee of the Paper Industry, 1982, pp. 14-15, 114, and 292).

With respect to claim 11, Stromberg et al, Stigsson, Bair et al and Tate do not disclose expressly that brown softwood pulp recovered from step c) is combined with bleached hardwood pulp in a paper mill producing multi-ply liner board products, said hardwood pulp being produced using a cooking liquor recovered from the chemicals recovery plant of step f). However, these references do not expressly exclude use of the disclosed process steps from use with hardwood furnish. In particular, Stigsson discloses that hardwoods are preferred raw materials as they are easier to pulp (page 9, lines 32-35). Stigsson also discloses a cooking liquor recovered from the chemicals recovery plant of step f) (page 33, lines 29-33).

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Elliot et al discloses combining hardwood and softwood pulp in a paper mill (column 13, lines 34-47) and a bleached hardwood pulp in particular (column 10, lines 43-53), and further discloses a multi-ply structure (column 3, lines 1-14) and a liner-board composition (column 3, lines 17-21).

Smook discloses blending of stock because of variations in wood furnish (page 114, column 1, lines 2-9), and multi-ply linerboard produced with a high-yield pulp in the bottom liner and a lower yield, well-refined pulp in the top liner (page 292, column 1, lines 18-20). Smook further discloses that the yield of pulp per unit volume of wood is usually directly related to density (page 15, column 1, lines 3-5) and that hardwoods tend to have higher densities than softwoods (page 15, column 1, lines 8-11).

Stromberg et al, Stigsson, Bair et al, Tate, Elliot et al, and Smook are analogous art because they are from the same field of endeavor, that of manufacturing paper pulp. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to blend hardwood and softwood pulp to produce a multi-ply linerboard as described by Elliot et al and Smook, manufactured from the impregnation and cooking processes of Stromberg et al, Stigsson, Bair et al, and Tate, to obtain the invention as specified in claim 11. The motivation for doing so would have been that multi-ply structures and linerboard compositions were previously known in the art (Elliot et al, column 3, lines 1-21); and that the primary requirements of linerboard are a high level of stiffness and burst resistance, along with good appearance and printability on one surface (Smook, page 292, column 1, lines 15-18); these needs are well

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satisfied by using a high-yield pulp in the bottom liner and a lower yield, well-refined pulp in the top liner (Smook, page 292, column 1, lines 18-20); and since the yield of pulp per unit volume of wood is usually directly related to density (Smook, page 15, column 1, lines 3-5), the higher density hardwoods would provide a higher yield pulp, and the lower density softwoods would provide a lower yield pulp.

Double Patenting

Claims 1, 5-8, 12, 13, and 15-17 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1, 7, and 13 of copending Application No. 10/660,660 in view of Stigsson (WO 00/47812), Stromberg et al, and Tate. The citations below for Stigsson (WO 00/47812) refer to the U.S. equivalent of that publication (US 6,770,168).

With respect to claim 1, '660 discloses a method for the operation of a pulping process using alkaline pulping liquors (Claim 1, step b)) comprising the steps of; b) charging an alkaline cooking liquor to chips recovered directly or indirectly from step a) (Claim 1, step b)); d) extracting cellulose spent liquor from step c) (Claim 1, step d)); transferring concentrated spent black liquor from step e) to a chemicals recovery plant (Claim 1, step e) and ii)); the method characterized in that h) the alkaline liquor used in step b) comprises dissolved boron and alkali metal compounds said boron compounds being present in a concentration corresponding to a molar ratio of alkali metal to boron of from about 2:1 to about 10:1 (Claim 1, step i)); with respect to claim 6, this range and

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the ranges of about 1.5 to about 5, and about 1.5 to 4 (claim 13) encompass the claimed range of about 2:1 to about 4:1.

Application '660 does not disclose expressly that the pulping process is high yield softwood pulping in a pulp mill; that the liquors are low sulfidity; a) contacting softwood chips with an aqueous impregnation solution comprising a quinone compound in an impregnation zone of a closed vessel at a temperature in the range from about 100°C to about 150°C and during a time period of from about 1 minute to about 120 minutes; that said cooking liquor has a sulfidity level below about 25 %; c) cooking impregnated softwood chips in the presence of said alkaline cooking liquor in a digester in order to obtain a brown pulp product in a yield ranging from 50 - 70 %; that the cellulose spent liquor comprises tall oil soap; e) removing tall oil soap from cellulose spent liquor and concentrating spent liquor in evaporators to provide a stream of concentrated spent black liquor; g) that a pH level below about 7 is maintained in the aqueous impregnation solution of step a) during at least a portion of said time period of from about 1 minute to about 120 minutes; or that i) further treatment of tall oil soap removed from cellulose spent liquor in step d) is performed by at least one of; i1) reacting tall oil soap with a chemical compound substantially free from sulfur and, i2) burning tall oil soap or partly acidulated tall oil soap in a combustion plant capable of accommodating alkali metal containing fuels. With respect to claim 7, '660 does not disclose expressly that the sulfidity of the alkaline cooking liquor of step b) is lower than about 10 %.

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Stigsson discloses that the pulping process is high yield (column 11, lines 14-19) softwood (column 7, lines 9-14) pulping in a pulp mill (column 1, lines 24-26); that the liquors are low sulfidity (column 1, lines 5-8); a) contacting softwood chips with an aqueous impregnation solution (column 8, lines 14-22) comprising a quinone compound (column 9, lines 4-12) in an impregnation zone of a closed vessel (column 8, lines 26-29) at a temperature in the range from about 50°C to about 150°C (column 8, lines 17-18), which encompasses the claimed range of 100°C to about 150°C, including one specific endpoint (150), and during a time period of from about 5 to 140 minutes, which encompasses the claimed range of about 1 minute to about 120 minutes, including one specific point (5); that said cooking liquor is substantially sulfur-free (column 1, lines 5-8), which indicates that the cooking liquor has a sulfidity level below the claimed range of about 25 %, and with respect to claim 7, lower than about 10 %; e) removing a portion of lignin and other organic material (column 23, lines 57-66), which encompasses the claimed tall oil soap, from cellulose spent liquor, and concentrating spent liquor in evaporators (column 20, lines 12-14) to provide a stream of concentrated spent black liquor; g) that a pH level of between about 0.5 to 7.0 (column 8, lines 53-57), which contains two specific points (0.5 and 7.0) within the claimed range of below about 7 is maintained in the aqueous impregnation solution of step a) during at least a portion of said time period of from about 1 minute to about 120 minutes; and that i) further treatment of tall oil soap removed from cellulose spent liquor in step d) is performed (column 23, lines 62-66).

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Stigsson does not disclose expressly that c) cooking impregnated softwood chips in the presence of said alkaline cooking liquor in a digester in order to obtain a brown pulp product in a yield ranging from 50 - 70 %; that the cellulose spent liquor comprises tall oil soap; or that the further treatment of tall oil soap is performed by at least one of; i1) reacting tall oil soap with a chemical compound substantially free from sulfur and, i2) burning tall oil soap or partly acidulated tall oil soap in a combustion plant capable of accommodating alkali metal containing fuels.

Stromberg et al is applied as in the § 103 rejection of claim 1, above, with respect to cooking chips to obtain a specific pulp yield. Tate is also applied as in the § 103 rejection of claim 1, above, with respect to tall oil soap in cellulose spent liquor and to further treatment of the tall oil soap.

With respect to claim 5, Stigsson discloses that the quinone compound used in step a) is selected from the group consisting of anthraquinone and derivatives thereof (column 10, lines 32-37).

With respect to claim 8, Stigsson discloses that spent impregnation liquor is removed from the impregnated chips stream prior to the charging of alkaline liquor to the chips in step b) (column 8, lines 30-32).

With respect to claim 13, '660 discloses that the cooking liquor in step b) comprises a metaborate compound in an aqueous buffer solution (Claims 1(b) and (i)). Application '660 does not disclose expressly that the cooking liquor consists primarily of alkali hydroxide, alkali metaborate and alkali carbonate dissolved in an aqueous solution.

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Stigsson discloses that the buffer solution primarily is made up of at least one of alkali metal hydroxides, alkali metal carbonates, alkali metal borates, and alkali metal phosphates (column 26, lines 40-43)

With respect to claim 15, '660 discloses that the alkaline cooking liquor of step b) is prepared without prior causticizing with lime or calcium compounds (Claim 1, step ii)).

With respect to claim 16, '660 discloses that chips in a digester or brown pulp recovered from step c) are subjected to treatment with oxygen delignification (claim 7). Application '660 does not disclose expressly that the oxygen source is an oxygen containing gas.

Stigsson discloses that the oxygen source is an oxygen containing gas (column 12, lines 25-28).

With respect to claim 17, '660 does not disclose expressly that treatment with an oxygen containing gas on softwood pulp is performed in a digester blowline before or after refining, in a brownstock washer or in a separate oxygen delignification reactor.

Stigsson discloses that treatment with an oxygen containing gas on softwood pulp is performed in a brownstock washer or in a separate oxygen delignification reactor (column 19, lines 11-41).

Application '660, Stigsson, Stromberg et al, and Tate are analogous art because they are all from the same field of endeavor, that of chemical pulping. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to apply low-sulfidity liquor for high-yield softwood pulping in a pulp

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mill as described by Stigsson; to impregnate chips with a solution comprising anthraquinone or derivatives in an impregnation zone in a closed vessel at temperature, time, and pH ranges as described by Stigsson, with removal prior to alkaline cooking; to remove tall oil soap from extracted spent liquor, with remaining spent liquor concentrated in an evaporator, as described by Stigsson; to treat pulp with an oxygen containing gas in a brownstock washer or separate reactor, as described by Stigsson; to cook to yields described by Stromberg et al; and to further treat tall oil soap as described by Tate; all in the pulping process of Application '660; to obtain the invention as specified in claims 1, 5-8, 12, 13, and 15-17.

The motivation would have been that new sulfur-free chemicals and more selective delignification methods combined with efficient recovery systems can lead to substantially better returns for the pulping industry along with environmental benefits (Stigsson, column 1, lines 31-34); softwoods can be used for the preparation of high quality pulp (Stigsson, column 7, lines 9-14); and pretreatment is performed to improve the effectiveness [e.g. yield] of the pulping process (Stromberg et al, column 1, lines 26-32).

This is a provisional obviousness-type double patenting rejection.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. US Patent 4,012,280 shows delignification of lignocellulosic material by treatment with an alkaline liquor (soda) in the presence of anthraquinone. US Patent 3,147,179 shows a pulping process with associated

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black liquor recovery, with tall oil soap removed during evaporation. US Patent 5,340,440 shows a method for recovering chemicals from a process using impregnation and low sulfidity cooking liquor. US 5,746,886 shows alkaline cooking with a liquor consisting of alkali metal hydroxides and alkali metal carbonates, followed by chemical recovery with concentration of spent liquor. US 6,413,367 shows treatment of cellulosic material with a chelating agent in impregnation prior to alkaline delignification, including soda anthraquinone cooking, and separation of tall oil as a by-product. US 6,533,896 shows a method for acid cleaning of lignocellulosic material in impregnation, followed by alkaline delignification.

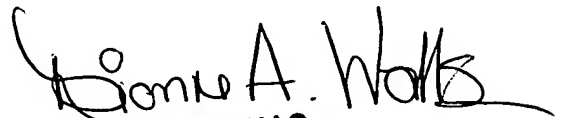
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anna Kinney whose telephone number is (571) 272-8388. The examiner can normally be reached on Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Steven Griffin can be reached on 571-272-1189. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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DIONNE A. WALLS
PRIMARY EXAMINER